

of 1865. All factories and mills in the western part of the city were compelled to suspend work. Farm property suffered great damage; hay, cattle, and fences were carried away and growing crops washed out or buried in the sediment left by the water. It is estimated that the loss to planters occupying the bottom lands between here and New Savannah will exceed \$50,000.

Charleston, South Carolina: on the 20th and 21st destructive freshets occurred in all the streams in the northern and north-eastern parts of the state. The Pedee River was very high, overflowing and completely destroying crops in the lowlands. Considerable damage was also done to railroads and crops in the northern and western parts of the state.

Abingdon, Washington county, Virginia: a very heavy fall of rain, which is described as a "water-spout," occurred here on the 27th. Farm property was injured and one person drowned.

HIGH TIDES.

Cape Henry, Virginia, 1st.

Smithville, North Carolina, 29th, 30th.

Cedar Keys, Florida, 6th.

LOW TIDES.

Albany, New York, 27th: as a result of ebb tide in the river the water was quite low and a number of vessels were grounded.

Low tides were also reported from—

Indianola, Texas, 1st, 2d, 3d, 6th, 16th, 20th, 27th, 28th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for May, 1886, with the telegraphic reports for the succeeding thirty-two hours, shows the general average percentage of verifications to be 75.85 per cent. The percentages for the four elements are: Weather, 78.21; wind, 76.56; temperature, 72.27; barometer, 75.53 per cent. The percentages for the several states are: Maine, 72.51; New Hampshire, 74.57; Vermont, 73.97; Massachusetts, 74.74; Rhode Island, 70.43; Connecticut, 69.66; New York, 74.65; Pennsylvania, 72.95; New Jersey, 77.81; Delaware, 77.26; Maryland, 76.84; Virginia, 78.08; North Carolina, 79.64; South Carolina, 85.09; Georgia, 85.23; Florida, 80.98; Alabama, 84.73; Mississippi, 84.50; Louisiana, 86.78; Texas, 84.42; Tennessee, 74.19; Kentucky, 77.69; Ohio, 74.00; West Virginia, 69.02; Indiana, 77.32; Illinois, 74.82; Michigan, 73.30; Wisconsin, 70.14; Minnesota, 67.03; Iowa, 69.62; Nebraska, 65.16; Kansas, 68.62; Missouri, 74.01; Arkansas, 79.48; Colorado, 84.44; East Dakota, 65.15. There were twenty-one omissions to predict, out of 9,764, or 0.22 per cent. Of the 9,743 predictions that have been made, seven hundred and fifty-six, or 7.76 per cent., are considered to have entirely failed; five hundred and forty-eight, or 5.62 per cent., were one-fourth verified; 1,730, or 17.76 per cent., were one-half verified; 1,283, or 13.17 per cent., were three-fourths verified; 5,426, or 55.69 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During May, 1886, there were fifty-two signals of various kinds displayed, of which number, twenty-four, or 46.15 per cent., were fully justified both as to the direction and velocities of the winds. Of the signals above mentioned twelve were ordered for northwesterly winds; of these, eight, or 66.67 per cent. were justified both as to direction and velocity, and nine, or 75.0 per cent., were justified as to velocity only. Seven signals were ordered for southwesterly winds, and two, or 28.57 per cent., were justified. Nine signals were ordered for northeasterly winds, and eight, or 88.88 per cent., were justified. Of fifteen cautionary signals ordered, without specifying the direction, none were justified. Nine "on-shore" signals were ordered at lake stations, and six, or 66.67 per cent., were justified.

In fifty-four cases winds occurred which would have justified the display of signals.

COLD-WAVE SIGNALS.

No cold-wave signals were ordered during May.

RAILWAY WEATHER SIGNALS.

Prof. P. H. Mell, jr., director of the "Alabama Weather Service," in the report for May, 1886, states:

The verifications of predictions for the whole area was 94 per cent. for temperature, and 90 per cent. for weather.

The following corporations comprise this system: South and North; Montgomery and Mobile; Mobile and Girard; Georgia Pacific; East Tennessee, Virginia and Georgia system in Alabama; Memphis and Charleston; Columbus Western; Atlanta and West Point of Georgia; Northeastern of Georgia; Western and Atlantic; East Tennessee, Virginia and Georgia system in Georgia; Montgomery and Eufaula; Pensacola and Selma; Pensacola and Atlantic; and the cities of Milledgeville, Georgia, and Talladega, Alabama.

Prof. Winslow Upton, director of the "New England Meteorological Society," in the report for May, 1886, states:

The verification of weather signals at New Haven was 71 per cent. for temperature, 83.9 for weather; at eighteen other stations reporting to the Secretary, 88.5 for temperature, 79.5 for weather. Local predictions made at Blue Hill gave 63 per cent. for rains, 81 for weather.

J. D. Plunkett, M. D., president of the "Tennessee State Board of Health," in the report for May, 1886, makes the percentage of verifications for temperature in the state 89.5, and weather, 84.4.

ATMOSPHERIC ELECTRICITY.

AURORAS.

The brilliant auroral display of the 8-9th was extensively observed, it having been reported from stations on the north Pacific coast, in the northern plateau, northern slope, and from various stations in that part of the country from 100° W. eastward to the Atlantic ocean, and lying north of the thirty-eighth parallel. This aurora was observed as far south as Statesville, North Carolina, and by a vessel on the Atlantic in N. 40° 24', W. 60° 40'.

Displays were reported during the month as follows:

Mackinaw City, Michigan: an auroral arch of 15° altitude and 80° azimuth, with an occasional streamer, was observed during the night of the 1st and 2d. A faint auroral light of 15° altitude and 45° azimuth, was also seen on the 20th, beginning at 10.30 p. m. and continuing until after midnight.

Tatoosh Island, Washington Territory: on the 3d an aurora was observed at 8 p. m., consisting of a diffuse white light extending from 3° east of, to 24° west of north.

Yankton, Dakota: an aurora was visible from 10.00 to 11.50 p. m. of the 8th, consisting of an arch of white light with streamers reaching, at times, within 30° of the zenith.

Valentine, Nebraska: an auroral arch was visible from 9.30 p. m. of the 8th until after midnight of the 9th. The centre of the aurora was about 15° east of north and extended over 30° of azimuth. At 10.20 p. m. streamers extending almost to the zenith were observed; at times they extended several degrees below the arch. The maximum brilliancy occurred at 10.30 p. m.

Saint Vincent, Minnesota: on the 8th at 9.50 p. m., a remarkably brilliant auroral display began. When first observed it consisted of a single streamer having a width varying from 4° to 8°, which spanned the sky from east to west, at the same time having a preceptible movement toward the west. At 10 p. m. the aurora had changed in shape, and appeared as a perfect corona; later it appeared as a diffuse, whitish light in the west, while in the east it presented a deep orange tint and had a very active undulatory motion, constantly changing in form. At 10.20 p. m. a beautiful and well defined "auroral curtain" was formed in the east, which appeared as though hung in loops or folds, owing to the peculiar arrangement of the beams; this formation lasted about five minutes. At 11.40 p. m. it appeared in the form of numerous broad streams of white light moving rapidly toward the zenith. At 12.40 a. m. of the 9th, a dark bank was observed on the northern horizon and the light above it was more brilliant, while in the east the aurora had almost disappeared. The phenomenon continued until 2.10 a. m. The Signal Service observer at this station

Table of miscellaneous meteorological data for May, 1886—Signal Service observations.

Stations.	Elevation above sea-level.	Atmospheric pressure (in inches and hundredths).					Temperature of the air (in degrees Fahrenheit).										Winds.																	
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.		Monthly mean.	Departure from normal.	Max.	Date.	Mean max.	Min.	Date.	Extremes.		Monthly range.	Daily ranges.		Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal.	Total movement.	Prevailing direction.	Maximum velocity.		Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.			
					Highest barometer.	Lowest barometer.								Mean min.	Greatest.		Least.																	
New England.																																		
Eastport	61	29.82	-.09	29.89	30.30	18	29.31	25.09	47.0	0.3	67.4	6	54.0	35.2	2	40.3	32.0	25.5	6	4.9	25	81.7	40.9	3.49	1.05	4,523	s.	29	e.	8	14	4	21	6
Portland	99	29.77	-.10	29.87	30.32	18	29.41	25.09	53.1	1.7	76.9	23	61.1	30.1	2	45.4	40.8	28.6	22	3.5	15	76.0	45.0	4.07	0.91	5,557	s.	26	nw.	9	13	10	14	7
Mount Washington	6,279	23.68	.....	29.86	30.20	18	29.31	26.08	34.5	0.9	49.2	30	40.7	18.5	26	29.0	30.7	21.9	25	3.9	26	89.7	31.5	3.25	0.27	11,985	nw.	88	s.	16	13	17	13	7
Boston	125	29.77	-.09	29.90	30.35	18	29.46	25.08	56.2	0.2	85.2	30	65.3	38.1	3	48.3	47.1	38.8	4	6.1	12	68.0	44.6	3.08	0.44	8,640	w.	36	e.	11	13	7	19	5
Block Island	27	29.88	.....	29.90	30.35	18	29.49	25.08	53.5	1.8	73.2	23	59.7	42.0	2	48.6	31.2	19.9	9	4.1	11	85.7	49.0	4.14	0.75	10,533	sw.	38	ne.	14	12	6	19	6
Narragansett Pier	.....	.....	.....	.....	.....	.....	.....	.....	55.8	.....	84.0	23	64.1	38.0	1	47.5	46.0	.....	.....	.....	.....	.....	3.55	0.14	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Haven	107	29.80	.....	29.91	30.34	18	29.55	25.07	56.6	1.3	85.5	23	66.2	32.3	1	47.2	51.2	28.8	1	7.9	11	69.6	45.6	2.74	0.86	5,763	s.	30	ne.	8	15	12	10	9
New London	47	29.88	-.09	29.92	30.37	18	29.54	25.08	56.8	0.6	83.3	23	65.1	37.6	2	48.5	45.7	30.9	6	6.2	12	71.3	46.7	3.45	0.11	5,359	sw.	31	e.	11	11	13	12	6
Mid. Atlantic States.																																		
Albany	83	29.83	-.08	29.91	30.34	18	29.58	27.06	59.1	0.0	83.0	30	69.6	39.6	1	49.0	43.4	31.2	1	5.5	15	63.8	45.6	3.40	0.53	4,326	nw.	28	s.	15	13	9	17	5
New York City	168	29.75	-.09	29.91	30.32	18	29.58	25.07	58.5	0.4	86.0	23	67.0	42.0	1	51.3	44.0	24.2	23	5.7	13	70.8	48.0	6.53	3.71	6,384	nw.	34	ne.	8	13	9	14	8
Philadelphia	117	29.81	-.07	29.92	30.33	18	29.58	25.07	60.9	1.0	86.2	23	70.2	43.4	1	52.8	42.8	28.1	3	4.8	8	73.4	51.2	4.50	1.61	7,264	s.	35	n.	8	17	11	12	8
Atlantic City	13	29.90	-.09	29.90	30.34	18	29.49	25.08	56.0	0.1	74.9	9	62.2	40.5	3	55.3	34.4	25.5	9	4.5	13	82.2	50.1	4.15	1.76	7,136	sw.	39	ne.	2	20	11	11	9
Sandy Hook	28	29.88	-.10	29.90	30.34	18	29.56	25.07	57.9	0.5	86.1	30	66.7	45.5	1	52.1	40.6	24.4	30	3.7	13	79.0	50.6	8.46	4.49	11,601	sw.	48	nw.	5	20	10	10	11
Cape Henlopen	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Baltimore	45	29.89	-.08	29.92	30.30	18	29.55	25.07	61.9	2.6	87.5	30	70.9	45.2	17	54.1	42.3	30.0	30	4.8	7	70.2	50.6	7.07	4.07	4,235	sw.	20	sw.	27	17	13	10	8
Ocean City	.....	.....	.....	.....	.....	.....	.....	.....	58.8	.....	72.1	29	63.0	40.6	7	50.5	31.5	.....	.....	.....	.....	.....	4.47	1.97	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington City	106	29.83	-.08	29.93	30.31	18	29.55	25.07	62.1	2.1	83.8	5	70.8	43.4	3	53.9	40.4	34.3	3	6.6	14	80.5	55.3	10.60	7.62	4,110	s.	24	w.	23	18	14	10	9
Cape Henry	16	29.92	-.08	29.92	30.35	18	29.48	25.08	63.1	0.9	86.0	10	71.4	46.1	2	55.7	39.9	32.6	4	5.5	18	60.6	56.4	7.25	3.91	10,796	sw.	60	nw.	1	12	6	13	12
Chincoteague	8	29.92	-.08	29.91	30.35	18	29.46	25.08	59.6	0.5	77.7	24	65.8	44.0	2	53.2	33.7	20.7	11	3.1	19	82.4	53.8	6.18	3.34	9,685	s.	50	ne.	1	15	8	12	11
Lynchburg	652	29.26	-.07	29.92	30.29	18	29.55	25.07	55.6	0.7	91.1	13	76.4	45.2	17	55.1	45.9	35.6	4	6.2	7	76.5	56.7	6.74	3.68	2,915	s.	17	nw.	8	16	6	18	7
Norfolk	30	29.92	-.07	29.93	30.32	18	29.48	25.08	65.0	1.6	87.0	15	73.2	44.7	2	54.1	42.3	34.3	15	2.6	1	74.7	55.9	8.32	4.76	4,732	sw.	27	ne.	1	16	8	14	9
South Atlantic States.																																		
Charlotte	808	29.14	-.03	29.95	30.25	17	29.58	27.06	68.3	0.4	92.0	13	78.9	45.0	1	57.4	47.0	30.4	3	6.1	18	77.8	60.5	11.04	7.72	4,007	sw.	25	w.	10	9	7	18	6
Fort Macon	11	29.97	-.02	29.95	30.29	18	29.50	1.078	68.1	0.2	88.8	28	73.0	47.4	2	62.8	31.4	20.8	3	5.2	31	81.4	62.0	2.33	2.03	11,758	sw.	44	nw.	1	10	4	13	14
Hatteras	12	29.96	-.04	29.97	30.33	18	29.42	10.01	66.2	0.1	80.0	22	72.1	48.7	2	60.3	31.3	20.0	15	5.5	2	80.1	59.3	2.71	1.47	8,166	sw.	48	nw.	1	10	4	11	10
Kitty Hawk	9	29.96	-.07	29.95	30.37	18	29.48	1.089	63.9	0.0	84.9	24	72.4	45.0	2	57.2	39.9	27.6	4	5.3	17	76.9	55.8	7.27	4.00	11,494	sw.	56	n.	1	10	6	15	10
New River Inlet	.....	.....	.....	.....	.....	.....	.....	.....	68.6	.....	82.0	21	76.6	40.8	2	60.7	35.2	.....	.....	.....	.....	.....	0.37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Smithville	34	29.94	-.06	29.95	30.26	18	29.60	1.066	70.2	0.7	81.0	15	76.9	45.1	2	61.7	38.9	25.1	3	5.1	17	78.9	62.9	1.46	1.59	8,679	sw.	36	sw.	7	11	3	10	18
Wash Woods	.....	.....	.....	.....	.....	.....	.....	.....	66.1	.....	81.0	19	71.2	49.0	1	61.0	32.0	.....	.....	.....	.....	.....	6.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wilmington	52	29.93	-.04	29.96	30.28	18	29.61	1.067	70.2	0.5	93.8	13	79.9	47.2	2	61.5	40.6	27.9	15	10.7	20	69.5	55.8	1.18	3.25	5,767	sw.	30	sw.	7	10	4	11	11
Charleston	52	29.95	-.03	29.97	30.24	4	29.69	7.054	72.8	0.1	94.0	15	81.0	49.1	1	65.3	44.1	23.9	13	5.5	19	69.5	61.5	1.00	3.37	6,217	sw.	24	e.	17	5	8	16	15
Augusta	183	29.82	-.03	29.97	30.21	4	29.59	7.062	72.2	0.2	97.0	13	85.3	47.0	1	60.8	50.0	34.0	9	9.6	21	69.4	57.6	6.29	2.97	7,785	sw.	26	w.	15	10	6	10	15
Savannah	87	29.92	-.02	29.98	30.23	4	29.70	7.053	75.0	0.4	93.0	15	82.9	53.8	2	67.2	39.9	23.2	3	6.0	19	70.4	63.7	4.37	1.42	5,926	s.	25	sw.	13	6	4	9	18
Jacksonville	43	29.97	+.01	30.00	30.22	4	29.77	7.045	75.8	0.5	91.8	14	85.0	55.9	3	66.9	35.9	26.2	9	7.0	20	69.4	63.9	2.81	1.38	4,619	sw.	27	sw.	7	5	5	11	15
Florida Peninsula.																																		
Cedar Keys	22	29.99	+.01	29.97	30.15	4	29.80	8.034	74.0	1.8	86.8	17	79.6	59.2	1	68.8	27.6	19.4	17	6.1	23	77.0	66.1	0.71	2.01	6,453	w.	34	nw.	8	4	4	14	13
Key West	20	30.03	+.04	30.00	30.12	12	29.85	8.027	78.9	1.1	90.9	20	84.8	69.5	2	75.2	21.6	16.2	14	4.8	8	72.7	69.1	0.11	3.86	6,988	n.	26	e.	3	3	3	14	13
Sanford	25	30.02	.....	30.01	30.19	4	29.82	8.036	74.4	0.6	93.1	15	85.2	57.6	2	65.4	35.5	28.8	15	11.9	18	71.7	69.5	0.89	2.12	3,927	w.	18	nw.	31	4	3	14	13
Eastern Gulf States.																																		
Atlanta	1,129	28.85	-.01	29.99	30.21	3	29.69	7.052	68.1	0.7	89.6	13	78.4	43.6	1	58.7	46.0	27.9	9	9.0	18	66.1	55.0	6.21	3.00	7,091	sw.	32	w.	7	9	2	13	16
Pensacola	30	29.99	+.01	29.98	30.17	4	29.79	7.038	73.8	0.0	88.6	31	81.4	54.9	1	67.5	33.7	21.2	3	7.6	19	74.4	64.5	0.75	3.63	6,542	sw.	29	ne.	18	2	2	13	16
Mobile	35	29.99	+.01	29.99	30.17	4	29.77	18.040	72.2	2.1	88.9	24	80.6	51.7	1	63.7	37.7	22.5	4	3.4	14	74.3	62.6	1.27	3.58	6,115	s.	28	sw.	18				

Table of miscellaneous meteorological data for May, 1886—Signal Service observations—Continued.

Stations.	Elevation above sea level.	Atmospheric pressure (in inches and hundredths).					Temperature of the air (in degrees Fahrenheit).										Winds.																			
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.		Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.		Monthly range.	Daily ranges.	Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal.	Total movement.	Prevailing direction.	Maximum velocity.		Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.											
					Highest barometer.	Date.				Lowest barometer.	Date.									Max.	Date.					Min.	Date.	Greatest.	Date.	Least.	Date.	Miles p. h.	Direction.			
Upper Miss. Valley.																																				
Saint Paul.....	831	29.04	+0.01	29.91	30.24	16	29.56	13	0.68	59.5	+1.1	84.3	22	71.4	33.2	16	48.4	51.1	30.5	7	7.2	9	66.0	46.3	0.82	2.68	4,454	n.w.	28	sw.	13	7	3	18	10	
La Crosse.....	725	29.15	—0.01	29.91	30.26	16	29.61	13	0.64	62.0	+2.3	84.0	22	71.5	39.8	16	53.0	44.2	28	6	8.5	9	67.7	51.1	0.86	2.47	5,024	n.w.	32	n.w.	13	9	1	17	13	
Davenport.....	615	29.30	—0.01	29.94	30.29	17	29.53	9	0.76	62.4	+1.1	85.0	13	73.0	38.9	7	53.0	46.1	31	0	7.1	8	70.5	51.9	3.73	0.55	4,503	sw.	36	n.	10	4	16	11	11	
Des Moines.....	849	29.06	+0.01	29.94	30.27	16	29.39	9	0.88	64.4	+3.5	93.6	21	77.3	37.4	16	54.6	56.2	33	8	9.2	6	70.3	53.6	4.01	1.52	2,933	ne.	20	no.	9	10	14	7	7	
Dubuque.....	665	29.18	—0.01	29.92	30.27	17	29.49	9	0.78	64.1	+0.9	86.2	22	75.9	40.1	16	53.8	45.9	26	8	13.8	3	71.5	53.5	4.40	0.41	4,539	e.	26	e.	9	9	5	11	15	
Keokuk.....	618	29.28	—0.02	29.94	30.26	17	29.62	14	0.63	68.7	+0.9	87.6	23	77.4	48.5	2	60.8	39.1	23	3	20.3	25	71.0	57.9	2.90	1.22	5,899	n.	37	e.	10	13	7	16	8	
Calmar.....	359	29.59	—0.03	29.93	30.29	17	29.54	14	0.75	65.6	+2.2	85.8	23	75.4	42.9	16	54.6	42.9	29	5	21.0	3	70.4	53.9	3.56	1.84	5,427	e.	36	n.w.	9	9	7	15	9	
Springfield.....	644	29.27	—0.02	29.93	30.29	17	29.48	14	0.81	69.4	+3.5	89.8	23	78.2	46.6	2	60.5	43.2	26	3	14	13	71.7	59.1	7.84	4.13	6,690	n.	44	n.w.	14	14	3	16	12	
St. Louis.....	571	29.35	—0.02	29.93	30.29	17	29.48	14	0.81	69.4	+3.5	89.8	23	78.2	46.6	2	60.5	43.2	26	3	14	13	71.7	59.1	7.84	4.13	6,690	n.	44	n.w.	14	14	3	16	12	
Missouri Valley.																																				
Lamar.....	1,028	28.88	—0.02	29.93	30.24	16	29.57	9	0.67	69.7	+1.1	90.4	29	81.7	44.4	1	58.6	46.0	32	1	16	15	68.5	57.4	3.59	0.41	6,513	n.	36	e.	14	4	1	15	15	
Leavenworth.....	842	29.05	—0.02	29.91	30.24	16	29.63	9	0.76	68.1	+3.5	92.5	26	81.0	43.0	1	57.1	49.5	31	2	25	12	5	58.4	4.71	0.41	4,005	n.	36	e.	17	11	5	12	14	
Omaha.....	1,113	28.80	—0.02	29.91	30.24	16	29.53	9	0.71	65.1	+2.9	92.0	21	77.9	41.0	16	54.1	51.9	37	8	20	9	64.6	51.1	4.58	0.40	4,269	n.	36	n.	14	13	6	17	11	
Valentine.....	2,603	27.28	—0.01	29.91	30.17	2	29.57	9	0.60	61.0	+0.9	95.2	20	74.6	35.3	2	49.8	59.9	36	1	20	13	4	56.5	4.32	0.26	8,113	e.	54	e.	9	12	6	20	5	
Huron.....	1,397	28.56	—0.03	29.91	30.20	2	29.56	9	0.65	59.6	+6.2	96.5	20	74.2	32.0	4	46.4	64.5	48	0	20	14	8	47.4	50.9	1.58	2.68	5,548	n.w.	27	sw.	13	12	3	20	8
Yankton.....	1,234	28.64	+0.02	29.92	30.23	2	29.49	9	0.74	62.3	+3.0	94.6	20	75.6	38.7	16	51.3	55.9	38	0	20	10	7	47.3	3.39	1.15	4,705	n.	32	ne.	9	13	1	22	8	
Northern slope.																																				
Fort Assinaboine.....	2,720	27.12	—0.00	29.98	30.23	16	29.62	9	0.62	56.7	+4.0	94.7	23	71.7	25.7	1	43.0	69.0	46	3	23	11	3	46.3	0.99	0.50	8,425	n.w.	45	w.	20	4	2	20	9	
Fort Benton.....	2,681	27.18	—0.00	29.97	30.24	16	29.63	9	0.62	57.0	+2.7	94.5	24	75.0	27.4	13	43.7	67.1	47	4	23	18	4	46.6	0.36	2.24	2,927	w.	25	e.	8	4	1	17	13	
Fort Custer.....	3,040	26.82	+0.04	29.92	30.20	16	29.59	8	0.62	58.3	+3.7	90.0	24	75.0	27.9	2	44.1	68.1	44	5	18	16	5	47.3	0.56	2.19	5,020	ne.	36	n.	8	7	6	21	4	
Fort Maginnis.....	4,340	25.54	—0.02	29.95	30.23	16	29.61	9	0.63	53.4	+5.1	91.7	23	67.8	22.6	4	41.8	69.1	41	8	23	8	1	57.3	0.84	0.54	8,242	n.	44	w.	20	13	7	19	5	
Fort Shaw.....	3,550	26.33	—0.02	29.94	30.20	16	29.62	8	0.58	55.1	+4.7	93.9	22	72.4	26.9	1	41.7	67.0	49	2	12	9	1	58.9	0.63	0.90	4,796	w.	41	sw.	9	5	1	14	10	
Helena.....	4,009	25.83	+0.02	29.95	30.22	16	29.61	8	0.62	54.9	+3.4	88.8	22	67.5	25.2	2	44.0	63.1	38	4	23	11	6	12	0.40	0.67	6,219	sw.	37	n.	31	2	3	21	7	
Poplar River.....	2,030	27.81	—0.02	29.94	30.22	22	29.55	10	0.67	56.5	+3.4	93.5	22	72.8	23.0	1	42.6	70.5	46	1	20	14	0	51.5	1.35	0.12	6,852	w.	41	w.	1	8	2	18	11	
Deadwood.....	4,600	25.39	+0.05	29.91	30.15	23	29.58	8	0.58	54.7	+5.5	86.0	20	65.4	25.6	2	44.9	60.4	33	6	17	0	8	40.8	1.01	4.15	2,186	sw.	16	sw.	12	8	3	16	12	
Cheyenne.....	2,841	27.06	+0.04	29.91	30.17	16	29.57	8	0.60	63.0	+4.4	91.6	20	77.1	36.3	15	52.1	55.3	33	9	19	13	2	64.9	49.1	3.67	0.57	6,131	se.	32	se.	1	11	3	20	8
North Platte.....	2,841	27.06	+0.04	29.91	30.17	16	29.57	8	0.60	63.0	+4.4	91.6	20	77.1	36.3	15	52.1	55.3	33	9	19	13	2	64.9	49.1	3.67	0.57	6,131	se.	32	se.	1	11	3	20	8
Fort Laramie.....	61.4	27.06	+0.04	29.91	30.17	16	29.57	8	0.60	61.4	+4.4	91.6	20	77.1	36.3	15	52.1	55.3	33	9	19	13	2	64.9	49.1	3.67	0.57	6,131	se.	32	se.	1	11	3	20	8
Middle slope.																																				
Denver.....	5,294	24.77	+0.07	29.92	30.19	16	29.61	8	0.59	61.0	+4.8	89.9	25	77.7	35.5	15	46.1	54.4	38	8	23	20	4	47.2	30.3	0.09	3.01	5,600	n.	39	n.w.	31	4	0	15	16
Pike's Peak.....	14,134	27.04	—0.00	29.99	30.23	24	29.70	9	0.53	57.1	+5.3	90.0	25	74.8	27.1	1	41.5	58.0	38	0	19	7	8	47.6	20.0	0.40	3.79	14,717	sw.	74	w.	5	7	1	9	21
West Las Animas.....	3,809	26.97	+0.09	29.90	30.16	23	29.54	9	0.61	66.6	+1.1	92.5	25	83.8	35.8	15	49.5	61.4	46	0	22	15	6	49.8	43.4	0.25	0.60	6,200	w.	44	ne.	2	3	1	17	13
Concordia.....	1,384	28.47	—0.02	29.90	30.19	17	29.45	9	0.74	66.2	+0.2	93.0	22	79.7	40.2	15	54.3	52.8	33	9	19	10	4	47.1	55.6	4.65	0.63	6,163	ne.	32	n.	6	10	2	13	10
Dodge City.....	2,517	27.38	+0.05	29.90	30.20	17	29.51	9	0.69	67.5	+4.9	94.1	22	82.9	35.8	15	55.0	57.3	38	1	20	15	5	64.1	52.6	4.00	3.92	8,319	n.	45	e.	4	5	4	11	16
Fort Reno.....	73.4	27.06	+0.08	29.89	30.14	16	29.56	8	0.58	69.7	+7.2	96.0	29	84.2	43.0	15	56.1	53.0	39	0	22	16	5	54.2	47.7	0.23	5.66	7,855	se.	49	n.w.	14	3	3	10	18
Fort Supply.....	2,650	27.21	+0.08	29.89	30.14	16	29.56	8	0.58	69.7	+7.2	96.0	29	84.2	43.0	15	56.1	53.0	39	0	22	16	5	54.2	47.7	0.23	5.66	7,855	se.	49	n.w.	14	3	3	10	18
Fort Elliott.....	2,650	27.21	+0.08	29.89	30.14	16	29.56	8	0.58	69.7	+7.2	96.0	29	84.2	43.0	15	56.1	53.0	39	0	22	16	5	54.2	47.7	0.23	5.66	7,855	se.	49	n.w.	14	3	3	10	18
Southern slope.																																				
Fort Sill.....	1,200	28.70	+0.02	29.90	30.18	16	29.57	9	0.61	75.6	+6.5	103.5	31	90.1	46.7	15	61.4	56.8	36	5	28	16	5	50.3	52.4	0.07	5.02	7,625	n.	42	se.	14	1	1	6	24
Abilene.....	1,745	28.17	+0.06	29.96	30.24	15	29.66	9	0.57	72.2	+10.7	104.7	12	91.2	50.3	15	64.9	54.3	35	2	19	7	6	49.1	53.3	0.33	7.85	8,841	n.	32	n.w.	14	2	1	8	22
Fort Davis.....	4,																																			

reports, that during the display telegraph wires worked badly and much difficulty was experienced in transmitting the midnight report.

Keokuk, Iowa: at 8.30 p. m. of the 8th, an auroral light of pale straw color was observed in the northern sky, extending from northeast to north-northwest, and rising to an altitude of thirty degrees at the centre. The light remained almost stationary, no changes being observed until 11.45 p. m. when it grew brighter, and flashes, resembling distant lightning, moved from the eastern to western extremity in rapid succession.

Rochester, New York: 8th, shortly after sunset greenish rays of light resembling the tails of comets were observed, reaching from the eastern horizon to several degrees beyond the zenith. About 9.00 p. m. a perfect corona formation was seen filling the northern heavens, with streamers converging at the zenith. At 11.00 p. m., fringes of light extended east and west nearly covered the whole southwest sky, the aurora quivering simultaneously with rapid pulsations which were clearly seen directly overhead. At 11.15 p. m. two arches were seen, one being a brilliant blue, the other a dull orange color. The display ceased early on the following morning.

Buffalo, New York, 8th: a beautiful aurora was observed from 8.30 to 11.45 p. m., consisting of an arch of pale yellow light, from which luminous beams shot upward with a tremulous motion, reaching the zenith and occasionally travelling along the arch like large waves. The centre of the arch appeared to be about 15° above the horizon; the display was most brilliant about 9.30 p. m.

Philadelphia, Pennsylvania: an aurora was observed from 11 p. m. until 3.30 a. m. on the night of the 8-9th. It first appeared as a diffuse white light; frequent slender beams arose from the northern horizon to a height of 33°; at 1.30 a. m. the aurora took the form of an arch, with the lower edge sharply defined; altitude of arch about 10° and azimuth between 130° and 210°. Luminous beams shot upward from the arch and moved toward the east.

Syracuse, New York: on the night of the 8-9th a brilliant auroral display was observed. It first appeared as a cloud, from which would burst luminous patches like smoky flames, or illuminated fog. A dark segment rose about 40° above the northern horizon from which many streamers were seen to rise and extend beyond the zenith.

Ithaca, New York: an aurora was observed from 8.30 p. m. to 1 a. m. on the night of the 8-9th. It first appeared in the form of a bright arch of white light about 20° above the horizon, with streamers extending at intervals to the zenith. The arch gradually descended, and faded away at 10° above the horizon. The display was faint at 10 p. m., but at 11 p. m. it revived and continued quite brilliant until 1 a. m.

Grampian Hills, Clearfield county, Pennsylvania, 8th: an auroral display appeared at 8.25 p. m., increasing in brilliancy until 9.30 p. m., when it had reached its maximum. A dark segment or arch, 25° high, extended from northeast to north-west. Bright streamers shot up from the bow of the arch and ascended nearly to the zenith; these streamers appeared at all points of the arch and continued until 10.30, when all seemed to blend into a general light. The phenomenon disappeared at 11 p. m.

Wytheville, Wythe county, Virginia: at 11 p. m. of the 8th, an aurora was distinctly seen extending from the east to the west.

Parkersburg, West Virginia, 8th: an aurora, extending from northeast to southwest, was observed at 9.30 p. m., and continued until 3 a. m. of the 9th.

Oswego, New York: a brilliant aurora began at 9.20 p. m. of the 8th. An arch formed at 10 p. m., extending from 20° west to 20° east of north, and having an altitude of 25°. Streamers of straw-colored light passed rapidly from the horizon to the zenith. The display reached its greatest brilliancy at 10 p. m., and disappeared early on the 9th.

Washington, City: at 9.40 p. m. of the 8th a faint aurora was observed. After 12.30 a. m. of the 9th it became much

brighter and assumed the form of an arch, the lower edge of which was well defined, and constantly rose and fell; the upper edge was very indistinct. The highest point of the segment was apparently four degrees west of the magnetic meridian. At 3 a. m. the arch had become almost imperceptible; the aurora became fainter, with an occasional diffuse streamer shooting upward to an altitude of thirty degrees; this continued until 4 a. m. when the aurora had gradually disappeared.

Capt. W. Rea, of the s. s. "Bassano," makes the following report relative to an auroral display observed on the night of the 8-9th, in N. 40° 24', W. 60° 40': "The northern lights had been showing for two hours, when they increased to an immense size, shining up and darting about in cloven-tongue shape. Immediately over the mast heads was one solid arch of light stretching from the eastern to the western horizon. The tongues joining this arch resembled half a wheel. There also appeared to be minor branches shooting up from the arch. The whole of this display showed a brilliant light and was an imposing spectacle."

Walla Walla, Washington Territory: on the 9th at 2 a. m. a bright aurora was observed situated between 165° and 190° azimuth. When first seen it appeared as a sheet of pale green light resting upon the horizon and extending to an altitude of 8°, with streamers which were constantly in motion.

Atlantic City, New Jersey: from 3.00 to 3.30 a. m. of the 9th, an aurora was observed, extending from north-northwest to northeast, having an altitude of fifteen degrees, with several large streamers reaching nearly to the zenith.

Albany, New York: shortly after midnight on the morning of the 9th an aurora was observed. It consisted of an arch having an azimuth of 150° to 190° and 15° altitude. The aurora was a pale straw color tinged with greenish light.

Huron, Dakota: a brilliant aurora, of constantly changing form, was observed from 8.30 p. m. of the 9th until after midnight. At times an arch would extend from northwest to east, and then change into innumerable waving beams of light, which extended to an altitude of 45°.

Sitka, Alaska: about 1 a. m. of the 9th, a dark segment of a circle, with a faint glow on its outer edge, was noticed in the southwest, covering fully one-third of the horizon. Suddenly, at 1.40 a. m., very brilliant flashes of green tinted light shot up from a point about 15° above the light rim of the dark segment, and converged in a point near the zenith. This continued until 1.55 a. m., when the rays instead of disappearing at the zenith seemed to discharge themselves into a peculiarly shaped cloud of light. At 2 a. m. the beams of light appeared to run together and form curtains of moving light, with a rapid lateral movement from the east to west. The curtains of light gradually increased in brilliancy until they nearly eclipsed the light of the moon. At 2.10 a. m. the aurora began to move slowly toward the northern horizon, the curtains moving from the southwest to the north, and began to fade away, but the auroral glow did not disappear until 4.45 a. m.

Gardiner, Kennebec county, Maine: a faint auroral light was observed at 9 p. m. of the 9th. At 10 p. m. it had assumed the form of an arch above a dark cloud. The aurora was very brilliant at 11 p. m.

Bismarek, Dakota: an aurora was seen from 11.15 to 11.50 p. m. of the 13th. Flashes of pale green light extended from azimuth 185° to 225°, shooting up to an altitude of 25°.

Marquette, Michigan: at 10.20 p. m. of the 14th, broad, faint beams of auroral light were observed in the northern sky, reaching almost to the zenith.

Fort Assinaboine, Montana: a faint aurora was observed in the north about 11.20 p. m. of the 20th, consisting of a pale, whitish colored arch about 12° to 15° altitude and 90° azimuth.

Saint Paul, Minnesota: a faint aurora was observed from 10.30 to 10.50 p. m. of the 30th; it appeared as a faint glow, 2° to 6° in width, hanging over a hazy segment 20° in altitude at the centre.

Auroral displays were also observed during the month, as follows:

1st.—Eastport, Maine; Alpena, Michigan; Poplar River, Montana.

2d and 5th.—Kent's Hill, Maine.

7th.—Windsor, Illinois.

8th.—Erie and Philadelphia, Pennsylvania; Fort Totten, Vermillion, and Webster, Dakota; Vevay and Spiceland, Indiana; Fort Madison and Bancroft, Iowa; Fallston, Maryland; Genoa, Nebraska; Princeton, North Volney, Factoryville, Syracuse, and Palmyra, New York; Statesville, North Carolina; Jacksonborough, North Lewisburg, Garrettsville, and Hiram, Ohio; Variety Mills, Virginia.

9th.—New Haven, Connecticut; Eastport, Maine; Cleveland, Ohio; Erie, Pennsylvania; Webster, Dakota; Fort Madison, Iowa; Allison, Kansas; Cambridge and Heath, Massachusetts; Nashua, New Hampshire; Le Roy, New York; Dale Enterprise, Virginia.

10th.—Moorhead, Minnesota.

11th.—Poplar River, Montana.

12th.—Eastport, Maine.

13th.—Fort Madison, Iowa; Manitowoc, Wisconsin.

17th.—Eastport, Maine; Chicago, Illinois; Fort Totten and Webster, Dakota.

20th.—Bismarck, Fort Totten, and Webster, Dakota; Moorhead, Minnesota.

21st.—Eastport, Maine; Moorhead, Minnesota; Webster, Dakota.

22d.—Quakertown, Pennsylvania.

23d and 24th.—Poplar River, Montana.

25th.—Vevay, Indiana.

26th.—Eastport, Maine.

28th.—Moorhead, Minnesota; Charlotte, Vermont.

29th.—Poplar River, Montana; Fort Madison, Iowa.

30th.—Poplar River, Montana.

CHART OF ELECTROMETER READINGS.

The first diagram of chart vi shows some of the results of simultaneous observations made at the Smithsonian Institution and at the office of the Chief Signal Officer. The distance between the two stations is slightly over one mile. The exposure at the office is that described in the MONTHLY WEATHER REVIEW for April. That at the Smithsonian Institution is from the north window of a tower on the north side of the building, the height of the collector above the ground being about fifty feet. The diagram shows observations made at both stations during the passage of a thunder-storm on June 14th.

The following notes were made at the Smithsonian Institution during the observations:

Date and time.	Remarks.
June 14, 1886, 11 a. m.—12 m.	Morning very oppressive, and during the forenoon showery and sultry; wind w., backing to sw., coming in light puffs; cloudy.
12.35 00 p. m.	Wind s. by e.
1.02 00	Very light rain began; ended in few seconds.
1.09 00	Distant thunder; cloudy, and heavy cu.-strat. clouds in west.
1.13 25	Thunder.
1.16 20	
1.17 40	
1.17 00	
1.17 00	Rain began; ended in few seconds; began again 1.20 15, very light; ended 1.22 00.
1.22 20	Distant thunder.
1.32 00	
1.27 30	
1.45 00	
	Rain began; wind sw., light; rain ended 1.39 20. Wind w., and clearing weather.
	Rain began 1.58 00, ended 1.59 45; began 2.01 00; very heavy cloud overhead.
2.45 00	Wind ssw., light; clearing here but dark and threatening in northwest; apparently storm is not more than ten miles away.
3.05 00	Wind calm; storm now overhead.

Date and time.	Remarks.
3.03 15-40	Thunder, at these times, the last figures giving times when no longer audible; wind w. by n., light.
3.07 30-42	
3.09 10-13	
3.10 08-10	
3.15 30-32	
3.17 30	
3.23 10-15	
3.26 15-18	
3.28 00-01	
3.33 30-33, sharp.	
3.42 45-46	
	Rain began 3.43 20; ended 43 50; heavy rain began 3.46 00.
3.50 00	Wind, in gusts, from w; thunder 3.52 45; rain, light, 3.55.
4.02 24-26	Rain ended 4.13, wind changing from n. to w.; peculiar cloud appearance in n. and ne. horizon.
4.04 45	
4.06 20	
4.06 25-29	
4.08 10-12	
4.09 58 to 4.10 00	
4.11 14-15	Wind light, from w.; few ci.-strat. clouds; clear in nw.; storm evidently over.
4.15 55	
4.20	

In the second diagram is exhibited the result of observations made at New Haven, the first part showing the observed potential of the atmosphere on April 6th during a heavy rain, with high northeast wind, but unaccompanied by the characteristics of a thunder-storm. The second part shows the record made at the same station during a thunder-storm on April 24th.

The last diagram of the chart exhibits the results of simultaneous observations at the Smithsonian Institution and at the office of the Chief Signal Officer on June 11th. On that day the sky was clear in the morning, the weather was warm, and cumulus clouds appeared in the afternoon. It is selected as a day on which no special electrical activity took place or was to be expected. It shows that under such conditions two stations, one mile apart, are subjected to influences producing limited variations quite independent of each other; while the first diagram shows that violent disturbances produce fluctuations sensibly the same at both points. The observations from which these curves are drawn are made at intervals of five minutes, except during violent fluctuations when they are often reduced to two minutes, and often to one minute.

The following notes are abstracted from the report of the observer at the Ohio State University, Columbus, Ohio, and contain interesting examples of the appearance of negative potential some time in advance of a thunder-storm or rain:

The potential of the air was negative during the snow storm of April 6th, and negative before rain on April 26th and 29th. The rest of the month it was positive, and ranged between 7 and 175 volts.

On May 4th the potential was negative nearly all day, varying from 10 volts, positive, to 63, negative. Rain fell on the morning of the 5th; negative indications on this date. On May 10th, 11th, 12th the potential was negative all the time from 5 to 40 volts. Thunder storm on the night of 10th; rain on 11th; thunder storms on nights of 12th and 13th. The potential was negative on the 14th, ranging from 5 positive to 30 volts negative; a thunder storm occurred during the night of the 15th. On May 25th the potential was negative, 10 volts, at 11 a. m.; a thunder storm occurred at 7 p. m. On May 27th a thunder storm passed to the west of the station at 2 p. m., but no rain occurred. For that day the readings were: 10 a. m., 69 volts; 12 m., 50 volts; 1.45 p. m., 25 volts; 2 p. m., —22 volts; 2.10 p. m., —12 volts; 2.20 p. m., —23 volts; 2.30 p. m., —5 volts; 4 p. m., 6 volts. During the rest of the month the potential was positive. The maximum was 120 volts positive, and occurred on the 26th.

THUNDER STORMS FOR MAY, 1886 (by Jr. Prof. H. A. Hazen).

The total number of storms reported was 2,734. Voluntary observers reported 765, special thunder-storm observers, 1,571, and Signal Service observers, 398. The following table shows the number of storms on each day by states and districts. The days of greatest frequency was the 12th, 22d, 23d, 24th, and 14th, and of least frequency, the 1st, 2d, 16th, 17th, and 19th. The storms of the 11th and 12th accompanied the destructive storms of those dates in Kansas and Ohio:

Thunder-storms by districts, May, 1886.

District.	State.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	Total.	
I.	Connecticut					3															3		3								6	5	20	
	Maine					1							1	1							6		2	1	1		1				7	8	21	
	Massachusetts		1		1	5			1												16		2								5	12	43	
	New Hampshire					1							1								2		2		1						5	12	12	
	New York				9	3					2	1		6	1	6					4		1								2	4	10	
	Rhode Island					2					1										1	1	1								2	1	11	
	Vermont																				1	3		3		1								
	Total		1		10	15			1		3	1	2	7	1	7				1	35	1	21	1	3		1				30	18	159	
II.	Delaware																																	
	Maryland			1		3	9	6			10	7	2	5	4	8					1		1	11	4	5	3	2	5			3	84	
	New Jersey				1	4	5	5	1		3	2								1	5		1	11	4	5		7			4	4	61	
	North Carolina							1	4	1			2							1	3	3	1	3	7	10	1	1	3	5		7	63	
	Pennsylvania				2	5		2			1	5	3	5	1		2	1			7		1	14	7	4	7	4			2	2	70	
	Virginia					11	11	1	1		1	1	9	9	13	11	12		1	1	1	4		6	10	7	4		10		5	11	139	
	West Virginia					1	1				2	2	3	3		1						1	3		1	1					1	20		
	Total			1	3	13	27	28	3	2	21	23	23	22	15	27	1	2	5	4	18	5	47	33	30	8	1	31	5	11	28	437		
III.	Illinois	2		6	5	5	9	1	6	22	11	10	9	5	11	2					1		4	8	1	1		3		6	2		130	
	Indiana	2	1		5	1	5		1	9	16	10	23	7	13	2					1		4	17	4			3		1	4		130	
	Kentucky					1	4	1				2	3								2		1	2	2		2						22	
	Ohio	2	1	1	27	21	13	3	2	10	13	54	127	45	83	26					3	2	4	11	150	143	9	19	68	7	2	37	6	1,032
	Tennessee	1			3	7	2							3	4						4	5	6	1	1	8		3	4	5	8		66	
	Total	7	2	7	38	31	38	7	9	41	83	77	159	58	111	34		3		8	10	10	121	178	158	10	19	79	11	14	51	6	1,380	
IV.	Michigan	3					1			4		1	11	3	7	1						3	2	4			15	3			1		59	
	Minnesota			1					1	2	1	2	2		3									2									14	
	Wisconsin	1			1	1			2	2	1		2	5	1	2		2	2			3	1										27	
	Total	4		1	1	1	2		3	8	2	3	15	9	8	3	1	2	2			6	3	6			15	3		1	1		100	
V.	Dakota			1			1	2	4	2		5	4	2							3	3	1		1	2	1	1	3	1	4	5	50	
	Iowa			5	1	2	3	2	11	18	2	1	25	30	13	1		1	25	2	2	15	44	15	1	33	10	1	17	21	11	3	315	
	Nebraska	1	1	6	2	4	5	2	2	4	1	3	4		3							4	3			1	1	1	1	8	8	2	68	
	Total	1	1	12	3	6	9	6	17	24	3	9	33	32	16	1	4	2	25	2	5	18	49	18	2	36	12	3	21	30	23	10	433	
VI.	Arkansas					1				2				3							1			2					1	1	2	1	1	16
	Indian Territory																																	
	Kansas	1	7	9	11	3	11	1	4	1		17	1	11	12		14						4	8	2	1		2	5	6	12	1	144	
	Missouri				1	2	5	6	1	2	4	1	7		1	8		1	1					8	8			2		5	6	4		65
	Total	1	7	10	13	9	18	2	6	7	1	24	1	12	23		15	1			1		4	18	2	1		5	6	13	19	6	225	
	Grand total	13	11	31	68	75	94	43	39	92	113	137	233	140	174	72	21	10	32	15	69	40	245	254	195	55	48	121	43	58	135	68	2,734	

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories during the month, as follows:

Alabama.—6th, 16th, 28th.
 Arizona.—5th, 11th, 12th, 21st, 24th, 29th.
 British Columbia.—19th.
 California.—1st, 2d, 5th, 6th, 10th, 11th, 12th, 21st, 22d, 23d, 25th to 29th.
 Colorado.—5th, 15th, 18th.
 Connecticut.—1st, 6th, 7th, 9th, 18th, 23d.
 Dakota.—1st, 16th, 19th, 22d.
 District of Columbia.—10th, 12th, 20th.
 Florida.—4th, 7th, 15th, 17th, 18th, 23d to 26th, 28th.
 Georgia.—17th.
 Idaho.—3d, 5th, 10th, 14th, 28th.
 Illinois.—2d, 6th, 8th, 11th, 13th, 14th, 16th, 17th, 21st, 23d, 30th.
 Indiana.—3d, 4th, 8th, 17th, 24th, 25th, 26th, 30th.
 Iowa.—2d, 4th, 10th, 11th, 16th, 17th, 25th, 27th, 29th, 30th, 31st.
 Kansas.—3d, 12th, 13th, 16th, 31st.
 Kentucky.—17th.
 Maine.—7th, 10th, 24th.
 Massachusetts.—1st, 6th, 7th, 10th, 13th, 14th to 15th, 18th, 19th, 20th, 27th, 30th.
 Michigan.—7th, 8th, 13th, 23d, 29th.
 Minnesota.—20th.
 Missouri.—17th.
 Montana.—4th, 8th, 22d.
 Nebraska.—20th, 22d.
 Nevada.—2d, 21st, 25th, 29th.
 New Hampshire.—10th.
 New Jersey.—1st, 9th, 14th, 18th, 29th, 31st.
 New Mexico.—15th.

New York.—1st, 3d, 4th, 7th, 8th, 9th, 14th, 17th, 18th, 21st, 29th.

North Carolina.—19th.

Ohio.—3d, 5th, 7th, 8th, 11th, 12th, 14th, 17th, 18th, 22d, 24th, 31st.

Oregon.—1st, 2d, 3d, 15th, 16th, 22d, 25th.

Pennsylvania.—2d, 7th, 14th, 17th, 18th, 23d, 24th.

Rhode Island.—7th, 18th, 27th.

South Carolina.—4th.

Tennessee.—3d, 5th, 12th, 13th, 14th, 17th, 18th, 29th.

Texas.—12th, 17th.

Vermont.—7th, 24th.

Virginia.—5th, 6th, 11th to 14th, 17th, 18th, 24th, 30th.

Washington Territory.—2d, 6th, 15th, 18th, 19th, 25th, 30th.

Wisconsin.—4th, 11th, 12th, 16th, 17th.

Wyoming.—3d, 7th, 10th, 12th, 13th, 15th, 24th, 28th.

LUNAR HALOS.

Lunar halos were observed in the various states and territories, as follows:

Alabama.—16th, 17th.

Arizona.—9th, 10th, 12th.

Arkansas.—12th, 13th.

California.—11th, 13th, 14th, 18th, 21st, 22d.

Colorado.—12th.

Dakota.—11th, 16th.

District of Columbia.—7th, 17th, 18th.

Florida.—14th, 15th.

Atlanta.—14th.

Illinois.—10th, 12th, 13th, 17th, 19th, 27th.

Indiana.—8th, 9th, 13th, 16th, 17th, 18th.

Iowa.—10th, 12th, 13th, 14th, 16th.

Kansas.—10th to 13th.

Kentucky.—10th, 13th, 17th.

Louisiana.—15th, 16th.

Maine.—7th, 10th, 13th, 18th, 26th.